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EXAMINER

DASTOURI, MEHRDAD

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 07/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/760,052

Applicant(s)

RAJAGOPAL ET AL.

Examiner

Mehrdad Dastouri

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 14 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 14, 19 and 22-44 is/are rejected.
- 7) ☒ Claim(s) 11-13, 15-18, 20 and 21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Response to Amendment***

1. Applicants' amendment filed May 14, 2004, has been entered and made of record.
2. Objection to Claims 14-18 has been withdrawn in view of Applicants' amendment.
3. 35 U.S.C. 112, second paragraph rejection of Claims 21 and 15 have been withdrawn in view of Applicants' amendment and remarks.
4. Applicants' arguments regarding Claims 1, 26, 38 and 39-42 (and their dependent claims), have been fully considered but they are not persuasive. Applicants argue in essence that Prior art of record (Hibbard, Gross, Nakajima and Nishiya) fails to disclose, "unified signal transform" of the set of signals. Applicants refer to the present application disclosure Page 20, Lines 16-29 for the specific definition of the unified signal transform that may be operable to convert each of the set of candidate signals into a representation of generalized basis functions, wherein the basis functions represent the algebraic structure of the set of candidate signals.

It is noted that the features upon which applicant relies (i.e., Specification disclosure Page 20, Lines 16-29) are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

It is further submitted that, in one embodiment, the present application disclosure indicates that the unified signal transform may be considered a type of "generalized Fourier or Frequency Transform" that is designed specifically for the set of uncorrelated candidate signals. The teachings of prior arts of record (Hibbard, Gross, Nakajima and Nishiya) regarding Fourier transformation (general frequency transformation) meet broad limitation of generalized Fourier or Frequency Transform.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 3-10, 14, 19, 26-35, 38, 39, 43 and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Hibbard (U.S. 6,249,594).

Regarding Claim 1, Hibbard discloses a computer-implemented method for determining a "best match" of an input signal of interest from a set of candidate signals, wherein two or more of the candidate signals are uncorrelated, the method comprising:

determining a unified signal transform from the set of candidate signals (Figures 4A-4F; MAP Objective Functions, Fourier Elliptic transformation; Column 12, Lines 11-35);

applying the unified signal transform for at least one generalized frequency to each of the set of candidate signals to calculate a corresponding at least one generalized frequency component value for each of the set of candidate signals (Column 17, Lines 62-67, Column 18, Column 19, Lines 1-54; Column 22, Lines 8-59);

receiving the input signal of interest (Figures 4A-4F; Column 22, Lines 61-67, Column 23, Lines 1-6. The input signals of interest are synthetic pictures in which the boundary (black) to be contoured.);

applying the unified signal transform for the at least one generalized frequency to the input signal of interest to calculate a corresponding at least one generalized frequency component value for the input signal of interest (Figures 4-6; Column 23, Lines 7-64);

determining a best match between the at least one generalized frequency component value of the input signal of interest and the at least one generalized frequency component value of each of the set of candidate signals (Figures 4-6; Column 23, Lines 7-67, Column 24, Column 25, Lines 1-15)4); and

outputting information indicating a best match candidate signal from the set of candidate signals (Figures 4-6; Tables 1 and 2).

Regarding Claim 3, Hibbard further discloses the method of Claim 1, wherein the unified signal transform includes a set of basis functions which describe an algebraic structure of the set of candidate signals Column 18; Formulas (28) and (29), sine and cosine basis functions of Fourier series).

Regarding Claim 4, Hibbard further discloses the method of Claim 1, wherein the unified signal transform is operable to convert each of the set of candidate signals to a generalized frequency domain (Columns 17-20, Parametric Representation of Boundary Shape).

Regarding Claim 5, Hibbard further discloses the method of Claim 1, wherein the unified signal transform is operable to convert each of the set of candidate signals into a representation of generalized basis functions, wherein the basis functions represent the algebraic structure of the set of candidate signals (Columns 17-20, Parametric Representation of Boundary Shape).

Regarding Claim 6, Hibbard further discloses the method of Claim 1, wherein the unified signal transform is operable to decompose the signal into generalized basis functions, wherein the basis functions represent the algebraic structure of the set of candidate signals (Columns 17-20, Parametric Representation of Boundary Shape).

Regarding Claim 7, all of the candidate signals (signals used as reference) are conventionally obtained from a random population and consequently are uncorrelated with each other.

Regarding Claim 8, Hibbard further disclose the method of Claim 1, wherein the input signal of interest and the candidate signals are one of 1-dimensional signals, 2-dimensional signals, or 3-dimensional signals (Column 5, Lines 66-67, Column 6, Lines 1-15).

Regarding Claim 9, Hibbard further disclose the method of Claim 1, wherein the input signal of interest and the candidate signals are of a dimensionality greater than 3

(Column 16, Formulas (16) through (22). The image signal has at least four dimensions comprising of gray-level intensity, gradient, and coordinates  $x$ ,  $y$  for each pixel.

Regarding Claim 10, Hibbard further disclose the method of Claim 1, wherein the input signal of interest and the candidate signals comprise one or more of image data, measurement data, acoustic data, seismic data, financial data, stock data, futures data, business data, scientific data, medical data, insurance data, musical data, biometric data, and telecommunications signals (Column 1, Lines 11-16. The input signal of interest and the candidate signals comprise of image data, measurement data, scientific data and medical data.).

Regarding Claim 14, initial candidate signals inherently comprises of  $N$  candidate signal (there are at least Two signals, i.e.,  $N=2$ ), wherein at least one of said initial set of candidate signals comprises a set of  $M$  values, wherein  $M$  is greater or less than  $N$  (each initial candidate signal have at least one value, i.e.,  $M=1$ ).

With regards to Claim 19, arguments analogous to those presented for Claim 14 are applicable to Claim 19.

With regards to Claim 26, arguments analogous to those presented for Claim 1 are applicable to Claim 26.

With regards to Claim 27, arguments analogous to those presented for Claim 3 are applicable to Claim 27.

With regards to Claim 28, arguments analogous to those presented for Claim 4 are applicable to Claim 28.

With regards to Claim 29, arguments analogous to those presented for Claim 5 are applicable to Claim 29.

With regards to Claim 30, arguments analogous to those presented for Claim 6 are applicable to Claim 30.

Regarding Claim 31, Fourier transformation is a unified signal transformation.

With regards to Claim 32, arguments analogous to those presented for Claim 7 are applicable to Claim 32.

With regards to Claim 33, arguments analogous to those presented for Claim 8 are applicable to Claim 33.

With regards to Claim 34, arguments analogous to those presented for Claim 9 are applicable to Claim 34.

With regards to Claim 35, arguments analogous to those presented for Claim 10 are applicable to Claim 35.

With regards to Claims 38, 39 (A digital image is comprised of pixel data which are the candidate data set), 43 and 44, arguments analogous to those presented for Claim 1 are applicable to Claims 38, 39, 43 and 44.

7. Claim 42 is rejected under 35 U.S.C. 102(e) as being anticipated by Gross et al (U.S. 6,240,372).

Regarding Claim 42, Gross et al disclose a computer-implemented method for determining a "best match" of an input telecommunications signal of interest from a set of candidate telecommunications signals, wherein two or more of the candidate telecommunications signals are uncorrelated, the method comprising:



determining a unified signal transform from the set of candidate telecommunications signals (Abstract);

applying the unified signal transform for at least one generalized frequency to each of the set of candidate telecommunications signals to calculate a corresponding at least one generalized frequency component value for each of the set of candidate telecommunications signals (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14);

receiving the input telecommunications signal of interest (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14);

applying the unified signal transform for the at least one generalized frequency to the input telecommunications signal of interest to calculate a corresponding at least one generalized frequency component value for the input telecommunications signal of interest (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14);

determining a best match between the at least one component value of the input telecommunications signal of interest and the at least one component value of each of the set of candidate telecommunications signals (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14); and

outputting information indicating a best match candidate telecommunications signal from the set of candidate telecommunications signals (Abstract; Figures 8A, 8B, 9A, 9B, 16A and 23A; Columns 11-14).

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claim 40 is rejected under 35 U.S.C. 102(b) as being anticipated by Nakajima et al (U.S. 5,915,034).

Regarding Claim 40, Nakajima et al disclose a computer-implemented method for determining a "best match" of an input biometric signal of interest from a set of candidate biometric signals, wherein two or more of the candidate biometric signals are uncorrelated (Set of candidate biometric signals (Facial features) are collected from different people and are consequently uncorrelated), the method comprising:

determining a unified signal transform from the set of candidate biometric signals (Figure 4, Step S408);

applying the unified signal transform for at least one generalized frequency to each of the set of candidate biometric signals to calculate a corresponding at least one generalized frequency component value for each of the set of candidate biometric signals (Figure 4);

receiving the input biometric signal of interest (Figures 4 and 9A);

applying the unified signal transform for the at least one generalized frequency to the input biometric signal of interest to calculate a corresponding at least one generalized frequency component value for the input biometric signal of interest (Figures 4 and 9A);

determining a best match between the at least one component value of the input biometric signal of interest and the at least one component value of each of the set of candidate biometric signals (Figure 10); and

outputting information indicating a best match candidate biometric signal from the set of candidate biometric signals (Figure 2).

10. Claim 41 is rejected under 35 U.S.C. 102(b) as being anticipated by Nishiya et al (U.S. 5,109,431).

Regarding Claim 41, Nishiya et al disclose a computer-implemented method for determining a "best match" of an input stock history waveform of interest from a set of candidate stock behavior waveforms, wherein two or more of the candidate stock behavior waveforms are uncorrelated (Column 2, Lines 43-59), the method comprising:

determining a unified signal transform from the set of candidate stock behavior waveforms (Figures 1, 2 and 3c; Column 2, Lines 51-68, Column 3, Lines 1-8);

applying the unified signal transform for at least one generalized frequency to each of the set of candidate stock behavior waveforms to calculate a corresponding at least one generalized frequency component value for each of the set of candidate stock behavior waveforms (Figures 1, 2 and 3c; Column 2, Lines 51-68, Column 3, Lines 1-8);

receiving the input stock history waveform of interest; applying the unified signal transform for the at least one generalized frequency to the input stock history waveform of interest to calculate a corresponding at least one generalized frequency component value for the input stock history waveform of interest (Figures 1-6; Column 2, Lines 51-68, Column 3, Lines 1-40);

determining a best match between the at least one component value of the input stock history waveform of interest and the at least one component value of each of the set of candidate stock behavior waveforms (Figures 12 and 13); and

outputting information indicating a best match candidate stock history waveform from the set of candidate stock behavior waveforms (Figure 10; Column 14, Lines 3-6).

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 2, 22-25, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hibbard (U.S. 6,249,594).

Regarding Claim 2, Hibbard does not explicitly disclose further limitations recited in Claim 1.

Limitations recited in Claim 2 comprising:

subtracting each of the respective at least one generalized frequency component values of each candidate signal from the at least one generalized frequency component value of the input signal of interest (calculating the distance between an N-dimensional vector representing the input pattern and the N-dimensional reference vectors of a particular class in an N-dimensional pattern recognition space); and determining a smallest difference between each of the respective at least one generalized frequency component values of each candidate signal and the at least one generalized frequency

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component value of the input signal of interest; wherein a candidate signal corresponding to the smallest difference is the best match candidate signal (classification of the patterns based on the minimum distance between input pattern vector and reference vectors) are the conventional template matching methodology routinely implemented in the art.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Hibbard's invention to incorporate further limitations recited in Claim 2 because it is a standard methodology routinely implemented in pattern recognition to identify the best match between the input and reference patterns (signals, images, etc.).

Claims 22-25, 36 and 37 recite limitations such as displaying the information on a display screen, storing the best match candidate signal in a memory medium of a computer system, processing the best match candidate signal to determine if the best match candidate is an acceptable match and processing the best match candidate signal to determine characteristics of the received input signal of interest. These are well known methodology routinely implemented in image processing and pattern recognition for manipulating the digital image data.

***Allowable Subject Matter***

13. Claims 11-13, 15-18, 20 and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 11 of the instant invention recites the method of Claim 1, wherein said determining a unified signal transform for the set of candidate signals comprises:

forming a matrix B from all of the values of the candidate signals, wherein each of the candidate signals comprises a corresponding column of the matrix B;

defining a matrix B, wherein the matrix B comprises a column-wise cyclic shifted matrix B;

defining a matrix A, wherein the matrix A comprises a cyclic shift matrix operator, wherein multiplying matrix A times matrix B performs a column-wise cyclic shift on matrix B, thereby generating matrix B, wherein  $AB = B'$ , wherein  $A = B'B^{-1}$ , wherein  $B^{-1}$  comprises an inverse matrix of matrix B, and wherein  $A^N =$  an NxN identity matrix, I;

performing a Jordan decomposition on  $A = B'B^{-1}$ , thereby generating a relation  $A = X_B \Lambda X_B^{-1}$ , wherein  $X_B$  comprises a matrix of normalized columnar eigenvectors of matrix B, wherein A comprises a diagonal matrix of eigenvalues of matrix B, and wherein  $X_B^{-1}$  comprises an inverse matrix of matrix  $X_B$ ; and

calculating matrix  $X_B^{-1}$ , wherein the matrix  $X_B^{-1}$  comprises the unified signal transform.

Claims 12 and 13 depend on Claim 11, and are therefore allowable.

Claim 15 of the instant invention recites the method of Claim 14, wherein M is less than N, the method further comprising:

providing additional N-M values for the at least one of said initial set of candidate

signals, thereby generating said set of candidate signals, wherein each one of said set of candidate signals comprises N values.

Claims 16 and 17 depend on Claim 15, and are therefore allowable.

Claim 18 of the instant invention recites the method of Claim 14, wherein M is less than N, the method further comprising: fitting a curve to the M values for the at least one of said initial set of candidate signals;

sampling the curve to generate N values for the at least one of said initial set of candidate signals, thereby generating said set of candidate signals, wherein each one of said set of candidate signals comprises N values.

Claim 20 of the instant invention recites the method of Claim 19, the method further comprising:

providing an additional N-M candidate signals to said initial set of candidate signals, thereby generating said set of candidate signals, wherein said set of candidate signals comprises N candidate signals, and wherein each one of said set of candidate signals comprises N values.

Claim 21 depends on Claim 20, and is therefore allowable.

### ***Conclusion***

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Contact Information***

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mehrdad Dastouri  
Primary Examiner  
Group Art Unit 2623  
July 17, 2004

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